



Through forward-thinking policy, cutting-edge research, and the promotion of energy innovations, California continues to be a global leader in combating climate change.

With this 2016 California Energy Commission Accomplishments Report, I am pleased to highlight the Energy Commission's role in the state's progress and some top achievements.

The Energy Commission took major steps to help consumers save money on their electricity bills. In January, the Energy Commission adopted first-of-its-kind energy standards for the next generation of light bulbs. With these new standards, consumers will save more than \$4 billion over the first 13 years. In December, the Energy Commission adopted first-in-the-nation energy efficiency standards for computers and monitors with support from industry, environmentalists, consumer groups and utilities. The standards will ultimately save Californians an estimated \$373 million annually.

As the Energy Commission encourages and tracks renewable energy, we know Californians are using energy from more renewable sources. The Energy Commission reported the state received 27 percent of the electricity delivered to retail customers during 2016 from renewable sources. The state is on track to meet its goal of deriving 33 percent of its electricity from renewable sources by 2020 and 50 percent by 2030.

Californians are also benefiting from the simple act of sharing good ideas. The Energy Commission continued to invest in innovations that need a small kick-start to get to market. We formalized a partnership with the Department of the Navy to install renewable energy and energy efficiency technologies on military bases.

Finally, we are proud of our commitment to diversity by expanding outreach to disadvantaged communities. As part of that effort, we completed a study on ways to reduce barriers preventing people and businesses in low-income areas from adopting clean energy technologies. The Energy Commission is stepping up efforts to reach out to applicants from disadvantaged communities about employment and grant opportunities.

It has been a productive year due to the leadership of our commissioners, our talented and dedicated staff, and our engaged stakeholders. I thank them for their professionalism, hard work and willingness to bring new ideas to bear.



44

The Energy
Commission took
major steps to
help consumers
save money on
their electricity bills.

77

Sincerely,

Robert B. Weisenmiller

Chair of the California Energy Commission



LEADERSHIP ON CLIMATE CHANGE

2016 Integrated Energy Policy Report Update

Published this year's Integrated Energy Policy Report (IEPR), which is an annual energy policy statement that assesses major energy trends and issues. It addressed the continued need to improve the energy efficiency of buildings and appliances, decarbonize the electricity sector, and reduce greenhouse gas emissions 40 percent below 1990 levels by 2030.

MOU With Jalisco, Mexico

Signed a memorandum of understanding (MOU) with the state of Jalisco, Mexico, to cooperate on clean energy policies and programs. The agreement will support cooperation in areas of mutual interest, including energy efficiency, renewable energy development and grid integration, low- and zero-emission vehicles, and clean energy technology.

Clean Power Plan

Collaborating with the California Air Resources Board (ARB) and CPUC, the Energy Commission helped develop California's plan to meet the United States Environmental Protection Agency's greenhouse gas reduction goals for 2030 under the Clean Power Plan technical analysis. It demonstrated that California could meet these goals with California's suite of aggressive climate programs.

California Climate Assessment

Prepared a suite of studies to identify the climate vulnerabilities of the electricity, natural gas, and petroleum sectors and to develop adaptation measures when needed. The Energy Commission is leading this effort in cooperation with the California Public Utilities Commission (CPUC) and energy utilities. With participation from 22 research groups, the studies support California's Fourth Climate Change Assessment that is due to the Governor and Legislature in late 2018. Researchers and policy makers developed foundational climate scenarios that will be used for long-term energy planning in California.

China-California Partnership

Led two California delegation visits to China to support efforts to expand trade and collaborate on combating climate change. The summer trip was to the United States-China Climate-Leaders' Summit and Power Sector Reforms dialogue, while the fall visit with the Governor's Office of Business and Economic Development was a trade mission involving clean-tech businesses.



to limit the increase of the global average temperature

to below 2 degrees Celsius. Currently, 165 jurisdictions

\$25.7 trillion in combined domestic product.

have joined, representing more than a billion people and

165 jurisdictions have joined, representing more than a billion people and \$25.7 trillion in combined domestic product.

ACHIEVING ENERGY EFFICIENCY

Proposition 39 Energy Expenditure Plans

Approved requested funding totaling \$363 million for 456 energy efficiency projects in the state's K-12 schools. This funding benefits 2,000 local educational agencies statewide. Commissioners also approved revised guidelines making more energy efficiency and clean energy generation projects eligible for Proposition 39 K-12 funding. Staff developed, deployed, and maintained the Proposition 39 K-12 program Web page, including a publicly searchable database of metrics related to approved projects.

Enforced Energy Efficiency Appliance Standards

Tested more than 60 electrical and water appliances in our California State University, Sacramento Engineering Energy Efficiency Laboratory resulting in 25 closed case investigations. Seventeen of these closed investigations were settlements with penalties totaling about \$2 million for appliances ranging from automotive battery chargers and small battery charger systems used for electric-powered lawn and garden equipment to kitchen faucets and spas.

Energy Conservation Assistance Act Loans

Approved 10 Energy Conservation Assistance Act loans and approved 6 low-interest loans and 4 zero-interest loans to cities, counties, transportation districts, and public schools. These projects are authorized as part of the Energy Conservation Assistance Act and will reduce electricity consumption and utility expenses, while reducing greenhouse gas emissions.

2016 Building Energy Efficiency Standards

Updated and approved providers, compliance software, and manuals for the 2016 Building Energy Efficiency
Standards well in advance of the January 1, 2017, effective date to allow industry time to prepare for the changes.
Launched a new Online Resource Center with educational materials on the 2013 and 2016 Energy Standards. The Energy Commission responded to local building officials by reducing the complexity of compliance documentation through consolidation and automation of information and forms. The Energy Commission also approved local ordinances that are more stringent than the state's 2016 Energy Standards for three cities.

Existing Buildings

The Energy Commission released the 2016 Update to the Existing Buildings Energy Efficiency Action Plan of 2015, describing progress on building energy efficiency programs. Developed concepts for a data analytics platform and energy use baselines for existing buildings.

Assembly Bill 802 Regulations

Drafted regulations for energy efficiency benchmarking for commercial and multifamily buildings with more than 50,000 square feet. Benchmarking may encourage building owners to implement energy efficiency measures. Public workshops were held, with adoption expected in 2017.



COLLABORATIVE PARTNERSHIPS

Aliso Canyon Action Plan

Identified measures to reduce reliance on the Aliso Canyon natural gas facility. The Energy Commission, CPUC, California Independent System Operator (California ISO), and the Los Angeles Department of Water and Power worked together to assess local energy reliability and develop summer and winter action plans to reduce risks after the facility was closed.

Mapping Changes to Our Climate

Developed high-resolution mapping through collaborations with universities, governments, and industry researchers to debut a next-generation tool examining how a changing climate will impact local regions from northern Mexico to southern Canada.

Pacific Coast Collaborative

Continued participation in the Pacific Coast Collaborative, working with regional partners (Alaska, British Columbia, Oregon, and Washington) to address climate change and establish a forum for leadership and information sharing on issues of concern to Pacific North America.

Energy Conservation During Heat Wave

Collaborated with the California Department of General Services and issued a call for action to all managers of state buildings in Southern California to take immediate steps to conserve energy during the summer heat wave.

International Delegations

Hosted 44 international delegations from more than 60 countries and six continents to exchange information on climate change, renewable energy, energy efficiency, research and development, and alternative transportation.

California High-Speed Rail Authority

Helped promote the use of renewable energy, the delivery of zero-net-energy buildings, and incorporation of zero-emission vehicle infrastructures through an MOU with the California High Speed Rail Authority. The High-Speed Rail Authority is committed to powering the rail system with 100 percent renewable energy sources, maximizing the reduction of greenhouse gas emissions throughout design and construction, and making energy efficiency a priority in design.





COMMITMENT TO DIVERSITY

Helping the Public

Released video tutorials for the public to use when participating in Energy Commission meetings.

The videos show how to participate in business meetings, how to comment electronically on the Commission's website, how to submit grant applications through a new online submittal system, and how to engage with the Commission's Public Adviser.

Outreach Programs

Worked on informing the most qualified loan and grant applicants and contractors, including, but not limited to, certified women, minority, disabled veteran, and LGBT business enterprises, about workshops, training, and funding opportunities, as mandated under Assembly Bill 865.

The Energy Commission has established these programs to reach out and help those underrepresented communities.

Energy Commission's Communications Plan

Tackled barriers to program participation and education for consumers by expanding the range of communications channels used and through translating materials in other languages. Communications methods used included webinars, public workshops, conference presentations, list distributed announcements, phone calls, mail, news releases, blog posts, and social media.

Diversity Working Group

Led by the Public Adviser's Office, the Diversity Working Group continued formalizing efforts to maximize opportunities for diverse communities to participate in and benefit from Energy Commission program and activities. In February, the Energy Commission launched the new diversity home page, creating a central location for information on diversity legislation, funding opportunities, events and activities. The working group also sponsored the Energy Commission's first EmPower California workshop where more than 130 participants from across California learned about Energy Commission grant and loan programs and how to apply. The group held its first Diversity Career Fair in April, giving Sacramento area residents the chance to learn about employment opportunities at the agency.



SB 350 Barriers Report

The Energy Commission adopted a study on the barriers low-income individuals face when considering energy efficiency and renewable energy. The report recommended the establishment of a new task force to coordinate all state agencies administering energy, water, and housing programs for low-income customers and disadvantaged communities to enhance collaboration. The study provided potential solutions and recommendations such as expanding solar opportunities for low-income customers and communities, making energy efficiency and onsite renewable energy tax credits a higher priority for low-income affordable housing rehabilitation projects, and setting up regional one-stop shops to help building owners, tenants, and small businesses in low-income and disadvantaged communities install clean energy upgrades.

77

to enhance collaboration.

TRANSFORMING TRANSPORTATION

Draft 2017-18 Investment Plan

Released the draft 2017-18 Investment Plan Update for the Alternative and Renewable Fuels and Vehicle Technology Program, which invests up to \$100 million annually in a broad portfolio of advanced technologies to reduce greenhouse gas and criteria pollutant emissions from transportation. As of December 2016, roughly \$635 million has been invested in more than 549 projects.

California Clean Air Awards

Received the 2016 California Clean Air Awards from the Coalition for Clean Air in honor of Commissioner Janea A. Scott as one of the "Queens of EV" for her work overseeing the Energy Commission's effort to expand the use of electric vehicles.

Biofuels

Awarded about \$25 million and leveraged an additional \$64 million in match funding for five biofuel production plants. These facilities, which are operational, are producing more than 30 million gallons per year of low-carbon diesel and natural gas substitutes and are selling fuel in California for commercial use. The projects help the Energy Commission's goal to build the capacity of California companies to produce economically competitive biofuels from waste-based and renewable feedstock. Doing so will help reduce petroleum imports from foreign countries and other states.

Funding Fast Charger Corridors

Issued funding opportunities to deploy fast charger corridors to reduce the existing gaps for electric vehicle drivers. In April, the Energy Commission approved \$9 million in grants to install 61 direct current (DC) fast chargers and 42 Level 2 chargers at 41 sites on nine north-south corridors. In December, the Energy Commission awarded \$11 million in funds to install 130 DC fast chargers and 87 Level 2 chargers at 79 sites on 15 east-west corridors.

California Sustainable Freight Action Plan

Helped develop the California Sustainable Freight Action Plan. This action plan charts a direction for transforming the state's multibillion-dollar freight movement system into one that is environmentally cleaner, more efficient, and more economically competitive than it is today. California is the nation's largest gateway for international trade and domestic commerce supporting the world's fifth largest economy.

Funding Advanced Technology Vehicle Demonstration Projects

Awarded more than \$11 million for two medium- and heavyduty advanced vehicle demonstration projects, including intelligent transportation systems at the Port of San Diego and the Port of Los Angeles. The field demonstration projects will enhance market acceptance and assist in commercializing clean vehicle technologies being used for the freight movement system at California seaports.



The Energy Commission is investing in hydrogen refueling stations to help pave the way for a zero-emission transportation future. To date, 48 hydrogen refueling stations have been funded, with 25 open as of December 2016. Transportation is responsible for 37 percent of California's greenhouse gas emissions, which is why Governor Edmund G. Brown Jr. has set a goal of getting 1.5 million zero-emission vehicles (ZEVs) on the road by 2025. The transition to ZEVs will help California meet its greenhouse gas reduction goals, improve air quality, and reduce petroleum dependence.

The transition to ZEVs will help California meet its greenhouse gas reduction goals, improve air quality, and reduce petroleum dependence.

44

DEVELOPING RENEWABLE ENERGY

State Leadership in Clean Energy Award

Received the 2016 State Leadership in Clean Energy Award for the New Solar Homes Partnership (NSHP), which aims to help developers install solar on new homes by 2020. The Clean Energy States Alliance, a nonprofit coalition of public agencies, honored the NSHP program for accelerating the adoption of clean energy technologies and strengthening clean energy markets.

Senate Bill 32

Initiated a roadmap to generate half of the state's electricity from renewables. SB 32 established the goal to reduce greenhouse gas emissions 40 percent below 1990 levels by 2030. Developed regulations and infrastructure for a new benchmarking program mandated by Assembly Bill 802.

Renewables Target of 50 Percent

Exceeded halfway mark to 50 percent renewable goal. The Energy Commission's latest tracking report released in the fall estimates that 27 percent of electricity retail sales came from renewable energy in California, putting the state on track to meeting its target of 33 percent renewables by 2020.

Renewable Energy Capacity Continues to Grow

Reducing greenhouse gas emissions and promoting renewable energy led California to more than triple its renewable energy capacity between 2001 and 2016.

Renewable energy capacity went from 6,800 megawatts (MW) in 2001 to 23,600 MW (including small, selfgeneration such as rooftop solar) as of October 31, 2016.

New Solar Homes Partnership

Dramatically increased solar installation on new residential buildings by providing financial incentives and other support through the Energy Commission's NSHP program. As of November 2016, participating developers installed a total of 17 MW of solar capacity on new California homes in 2016, with more than 1.5 MW installed on new affordable housing.

Geothermal Resources Development

Supported geothermal energy resource development by issuing nearly \$5 million in grant solicitations for local jurisdictions and for-profit companies to develop geothermal energy resources in California. To date, the Energy Commission's Geothermal Grant and Loan Program has provided \$74 million for 184 projects since 1981.

Renewable Energy Project Tracking

Tracking the status of the renewable energy projects that received environmental permits in California, including those outside the Energy Commission's jurisdiction.

Nearly 9,800 MW of renewable generation capacity has been permitted throughout California that could come online in the near future. About 3,200 MW of the permitted projects have also secured power purchase agreements.

Of the 1,720 MW of permitted projects with contracts, 920 MW are expected to come on-line by the end of next year.

Desert Renewable Energy Conservation Plan

The Energy Commission developed planning assumptions for the multiagency Desert Renewable Energy Conservation Plan (DRECP). Energy Commissioner Karen Douglas and other Energy Commission staff were instrumental in key outreach to stakeholders in Imperial, Inyo, Kern, Los Angeles, Riverside, San Bernardino and San Diego Counties, all of which have land within the DRECP area. The plan also identified more than 5 million acres of conservation land, as well as recreation areas. The second phase of the plan seeks to identify renewable energy development on private land, with the Energy Commission as the lead agency in the process. In September, the Department of the Interior finalized the first phase of the DRECP, capping an intensive eight-year effort with the goal of identifying areas for large-scale renewable energy development within 10.8 million acres of public land in the Southern California desert. In addition, the Renewable Energy Action Team, led by the Energy Commission and the California Department of Fish and Wildlife, released the California Desert Biological Conservation Framework. The framework provides the foundation for regional energy planning on private lands in the DRECP planning area.

44

The Department of the Interior finalized the first phase of the DRECP, capping an intensive eight-year effort with the goal of identifying areas for large-scale renewable energy development within 10.8 million acres of public land in the Southern California Desert.

77

EVALUATING POWER PLANTS

Siting

Reviewed eight natural gas-fired power-plant projects to identify any potential environmental impacts and ensure meaningful public involvement. If approved, these projects will provide an additional 3,800 MW of electricity to Californians.

Compliance

Monitored the environmental and regulatory compliance of more than 116 jurisdictional operating power plants located throughout California. Staff also oversaw the construction and regulatory compliance of more than 1,700 MW at three natural gas-fired plants and a 485 MW solar photovoltaic power plant, and the rebuild of nearly 150 MW of geothermal generation at a complex heavily damaged by a drought-related wildfire. Compliance issues have included glint and glare complaints, avian interactions, alternatives to drought-impaired water systems, the unearthing of cultural resources, and impaired fire protection systems. The Energy Commission also reached a settlement with the owners of the Abengoa power plant after staff investigated the extended loss of the fire suppression systems.

Geysers Geothermal Power Complex

Led construction oversight after a 2015 wildfire caused more than \$100 million in damage and destroyed four of the six cooling towers at the geothermal power facility. A little more than a year later, output at the Geysers complex has returned to normal.

Environmental Performance Report

Released the Electricity Environmental Performance Report (EPR) as part of the IEPR. The EPR highlights how California's greenhouse gas policies, in conjunction with related energy policies, have significantly changed the state's energy resource mix and the electricity system currently in use. This electricity system assessment provides an analytical basis for policy options that may be incorporated into future infrastructure development decisions.

San Joaquin Valley Least-Conflict Solar Project

Worked with the Conservation Biology Institute and partner state agencies to help identify more than 430, 000 acres of landscape most appropriate for solar photovoltaic (PV) development in the San Joaquin Valley and analyzed the transmission capacity available to bring PV generation onto the existing grid. The project was sponsored by the Governor's Office of Planning and Research with support from solar industry representatives and developers, agricultural and rangeland interests and environmental nonprofit organizations.

Renewable Energy Transmission Initiative 2.0

The Energy Commission and partner agencies launched the Renewable Energy Transmission Initiative 2.0 (RETI 2.0) to identify the constraints and opportunities for new transmission needed to access additional renewable resources. The Energy Commission, the California Natural Resources Agency, CPUC, California ISO, and U.S. Bureau of Land Management hosted a planning meeting about critical transmission needs as the State incorporates more renewable energy to drive down greenhouse gas emissions and meet California's renewable energy goals. Meeting California's renewable energy and greenhouse gas emission goals may necessitate the expansion of electricity transmission infrastructure to access new renewable power sources, both within and outside the state, according to a draft report released in December.

The Energy Commission and partner agencies launched the Renewable Energy Transmission Initiative (RETI 2.0) to identify the constraints and opportunities for new transmission needed to access additional renewable resources.

INVESTING IN ENERGY INNOVATION

Energy Innovation Showcase

Launched the Energy Innovation Showcase website to provide information on research and development projects funded through EPIC. The site provides key insights into EPIC projects, lists the award recipients and funding amounts, and explains how projects benefit ratepayers.

Reducing Air Pollution With Natural Gas Vehicles

Completed work on the development of a 9-liter advanced near-zero natural gas engine suitable for heavy-duty vehicles such as refuse trucks and transit buses.

This natural gas engine is the first to be certified at ARB's optional low-nitrogen oxide emission standards at 90% below current levels. It is the first addition to a portfolio of vehicle technology research targeted at reducing air pollutants to near-zero levels and reducing carbon emissions from the heavy-duty transportation sector.

Initial response to this engine offering has been strong, with several agencies upgrading their existing fleets including Santa Monica's Big Blue Bus fleet and LA Metro.

Bioenergy Demonstrations to Reduce Fire Risk

Supported technology demonstrations to convert forest and woody biomass to energy. These projects will use dead trees from areas that have been stricken by bark beetle infestation. If successful, the projects will yield nearly 8,500 megawatt-hours of electricity annually.

Water Savings Grants

Approved more than \$22 million in grants and contracts to promote innovative technologies and strategies that save water and energy or help optimize current water infrastructure. These projects included reducing the energy intensity of treatment processes while increasing water supplies, developing more efficient agricultural practices, researching, innovative leak detection technologies, and improving hydropower and hydrologic models.

EPIC Challenge

Launched the EPIC Challenge, a two-phased competition that challenges teams to conceptualize and build advanced energy communities. For the first phase of competition, 13 projects, including some in the state's more disadvantaged communities, were selected. Project teams are comprised of building developers, local governments, technology developers, researchers, utilities, and other partners.

Energy Innovation Ecosystem

Launched the California Energy Innovation Ecosystem to create a coordinated statewide infrastructure to guide and support California's clean energy entrepreneurs.

The ecosystem includes the California Sustainable Energy Entrepreneur Development Initiative, which provides seed funding for new energy inventions and the four regional energy innovation clusters that will coordinate and provide key services and resources to help clean energy entrepreneurs succeed.



Research and Development

The Energy Commission continued to play a critical role in building California's 21st Century energy systems by moving new energy inventions from the laboratory to the market. More than 100 projects totaling \$227 million were awarded through the Electric Program Interest Charge (EPIC) and Natural Gas Research Programs in 2016. These programs push cutting-edge research and technologies that help achieve California's energy goals while maximizing economic and environmental benefits to ratepayers. In December, more than 500 people attended the second annual EPIC symposium, which showcased a variety of EPIC projects. Featured panelists from EPIC-funded projects discussed topics ranging from zero-net-energy buildings, creating advanced energy communities, advanced power system technology and automation, and enabling distributed energy resource growth.

